

Prairie View A&M University

Quality Without Compromise

Template

**The Strategic Plan Update
for
Fiscal Years 2009-2013**

Department of Physics

2009

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

A. Executive Summary

Narrative description of the unit's achievements since 2004 or earlier, its aspirations, expectations and its unique challenges. Highlight projected goals for the 2009-2013 period. Address projected changes in programs/services (eliminations, modifications, additions). Describe how achieving future plans will impact student learning by strengthening learning (applicable to academic and educational support programs and services) or enhance the student learning environment (administrative support units).

Accomplishments Since 2004: *The faculty has been very active in submitting proposals for research and education initiatives, and have been very successful in receiving several grants. These grants supported faculty as well as several students. Additionally, several innovative changes have been made to the curriculum and program.*

Substantive Eliminations, Deferments, and Redirections Since 2004: *None.*

Status: SWOT Analysis

1. Strengths

- *The Department of Physics has the capability, the interest and the commitment to respond to any opportunity, in spite of the heavy teaching loads, reduced budgets and the elimination of two faculty positions - Dr. Thomas' and Dr. Judd's. The research funding substantially increased in 2005 due to a large, one year \$1.5M grant received by Dr. Storr.*
- *The department also proposed several changes in the courses inventory and program direction, and subsequently had them approved.*

2. Weaknesses

- *Insufficient coherence/overlap in research capabilities among faculty, that might make it difficult to establish large-scale research infrastructures, such as centers of excellence. Two faculty members were hired as a part of the PVAMU-NASA CARR commitment to NASA - Dr. Premkumar Saganti in fall 2003 and Dr. Kevin Storr in fall 2004. These were supposed to be new positions in addition to the existing ones. However, upon the retirement of Dr. Richard Thomas in 2004 and of Dr. Dennis Judd in 2005, their positions were never filled. Hence the faculty number has been back to 8.*

3. Opportunities

- *Physics is changing with many new subfields that cross disciplinary boundaries (for example, materials physics, computational physics, biophysics, chemical physics, entrepreneurship physics), most of which are absent from most traditional undergraduate physics programs.*

- *The job market for physicists (and other scientifically trained workers) emphasizes the need for broader training within science and for enhanced skills in communication and the ability to work in teams.*
- *As a result of several efforts (Raising Above the Gathering Storm that emphasized the special need for funding in physics and physical science) and the American Competitiveness Initiative (calling for significant increase in the number of well-qualified teachers) - funding for the National Science Foundation and the Office of Science, Department of Energy, has increased, and is expected to be doubled over the next five years.*

4. Threats

- *One of the recognized reasons for low enrollment in physics is the lack of properly prepared physics/physical science teachers in schools.*
- *There have been discussions, off and on, on the possibility of eliminating "low productivity" programs or merging them with other programs. Several years ago, there was an attempt to merge the departments of Chemistry and Physics.*

The Table on the next page shows the external factors and how the department has responded in the past.

TABLE 1 - EXTERNAL ENVIRONMENT AND RESPONSIVE ACTIONS

EXTERNAL CHALLENGE	DEPARTMENT'S RESPONSE
<p><i>Physics is changing with many new subfields that cross disciplinary boundaries (for example, materials physics, computational physics, biophysics, chemical physics), most of which are absent from most traditional undergraduate physics programs.</i></p>	<ul style="list-style-type: none"> ▪ <i>In 2003, the department introduced, in addition to the standard Traditional Physics Track, three more tracks: Applied Physics Track, Computational Physics Track and Medical Physics Track.</i>
<p><i>The job market for physicists (and other scientifically trained workers) emphasizes the need for broader training within science and for enhanced skills in communication and the ability to work in teams.</i></p>	<ul style="list-style-type: none"> ▪ <i>In 2007, in addition to making the physics degree program span 120 SCH (not the usual 125 or more SCH), the department has introduced an Inter-Disciplinary Minor, providing a physics major with a broader background and educational preparation for the workforce, with requirements to write papers and make presentations, along with a one semester Capstone Project.</i>
<p><i>One of the recognized reasons for low enrollment in physics is the lack of properly prepared physics/physical science teachers in schools.</i></p>	<ul style="list-style-type: none"> ▪ <i>A special choice of courses in the current degree plan provides the necessary training for certification to teach science in schools.</i> ▪ <i>This type of effort is also strengthened with efforts such as the Gates-Marshall project that provides a more rigorous education for high school students in addition to providing professional development for teachers.</i>
<p><i>Today's undergraduate student body is more diverse both ethnically and economically than that of twenty years ago, with backgrounds and motivations substantially different from those of most current physics faculty when they were undergraduates.</i></p>	<ul style="list-style-type: none"> ▪ <i>The department faculty and staff are engaged in a series of assessment efforts including self-assessment to understand this gap in generational and cultural differences, and are exploring ways to close the gaps and to reach out to the new generation.</i>
<p><i>Physics education research has established that there is a significant gap between what physics faculty believe they are teaching and what students actually learn. At the same time, physics education research has identified a number of teaching strategies that can help close that gap.</i></p>	<ul style="list-style-type: none"> ▪ <i>The department has substantially updated its laboratories so as to provide hands-on learning experience that makes physics less abstract and more enjoyable.</i> ▪ <i>Comprehensive assessment efforts are being designed to assess student learning.</i>
<p><i>The physics profession as a whole faces a public perception that scientists are odd and peculiar people, scientists have few other interests but their work, scientific work is dangerous, and that physics is old-fashioned, outdated, irrelevant to modern society.</i></p>	<ul style="list-style-type: none"> ▪ <i>Several application-oriented courses have been added, for example: Physics of Medical Imaging, Physics of Atmospheric Science, Online Weather Course, and Science of Everyday Life.</i> ▪ <i>A Science Education Center has also been created with rollercoasters, robotics, computer simulations, Nintendo Wii and other high technology experiential environments.</i> ▪ <i>These courses, along with the enhanced tutoring sessions and outreach efforts via Society Of Physics Students and the G-Force, should dispel these misconceptions.</i>

Status: Review the Effectiveness of Current Plan—2004

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

B. Vision of the Unit

The Department of Physics will be nationally recognized for its first-class undergraduate program by: maintaining comparable quality to the mainstream institutions of physics education and increasing world class research, to address and provide solutions to, the issues facing Texas and the nation.

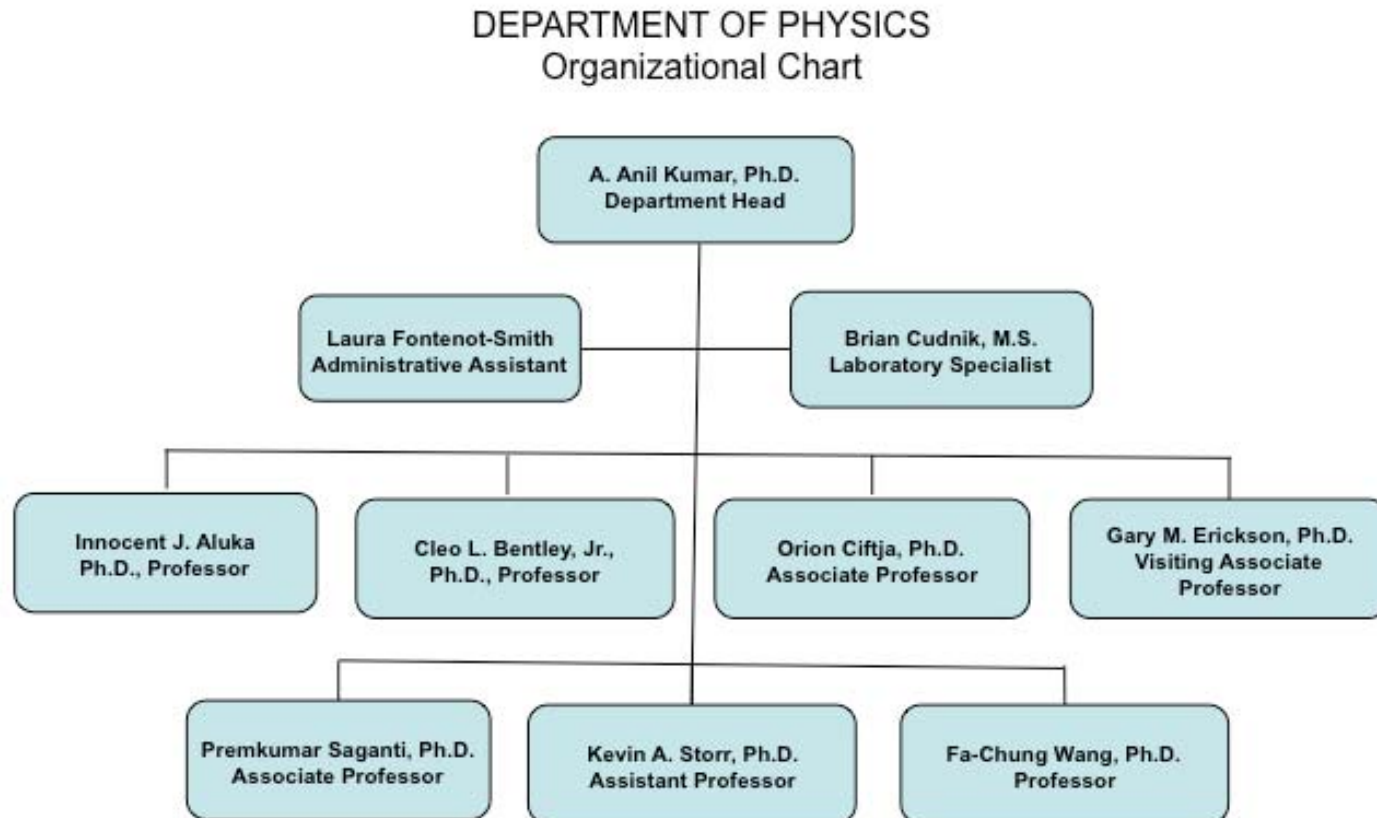
C. Mission of the Unit

The mission of the department is to provide students with an education and training in physics, supported by a strong foundation in the liberal arts curriculum, which will prepare them for advanced degrees and a variety of professional careers.

D. Relationship of the Unit's Mission to the University's Mission

The threefold mission of the university – Teaching, Research and Service – is reflected in the department's mission and its programs. In particular, it addresses the University Goals 1, 2, 3, 5, 7, 9. The newly reformatted degree program, in addition to graduating students with a strong preparation in physics, also supports the master's and doctoral level programs at the university. The department, as an integral member of the Texas A&M University System, is positioned to provide the necessary training at the B.S. level to enter into a pipeline to any of the related M.S. and Ph.D. programs in the System. The department is also participating in the training of science education majors as future teachers as well as preparing high school students to be successful in college. The department's research complements and enhances research at other units at the university, through demonstrated collaborative efforts among the various units. Through its small business mentoring and Mentor-Protégé programs, the department reaches out to the Waller County and the community at large by providing workshops, consultations, and technical assistance.

E. Current Organizational Structure



Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

F. Unit's Support of the University's Core Values

Department of Physics is committed to the implementation of university core values. These core values are particularly important for the education of the under-represented and under-prepared students that we serve. This unit strives to offer challenges to the academically talented and the under-prepared.

Institutional Core Values	Unit's Support of Core Values Most Applicable to The Unit
<ol style="list-style-type: none">1. Access and Quality2. Diversity3. Relevance4. Leadership5. Social Responsibility6. Accountability	<ul style="list-style-type: none">• Access and Quality & Diversity (#1 and #2): This unit practices these core values in its teaching, research, and service. The department strives to meet the needs of underrepresented population.• Leadership and Relevance (#4 and #3): the Department of Physics plays an important role in preparing our students to meet the challenges of the 21st century workforce.• Social Responsibility and Accountability (#5 and #6): incorporating relevance and leadership in training and mentoring student population with the appropriate training.

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

G-1. The Past: Major Outcome Achievements and Changes Since 2004 (Excluding Degree Program Outcomes Reported on Forms A-1) University Goal # __1____ (see Goal List)

Unit Goal	Objectives/Outcomes	Methods of Assessment and Year	Evidence (Form and Location)	Outcome to be continued in 2009-2013 Cycle Y=Yes N=No
Continue to modernize the Physics Department Laboratories	<ul style="list-style-type: none"> ▪ Modernized Laboratories 	Visual Inspection, Inventory of technology	Computer data collection facilities in (rooms 301, 303, 307, 325, and 327) Advanced Physics Laboratory, Computational Physics Laboratory, Medical Imaging Laboratory, Magnetic Field Laboratory, Physics Learning Center.	Y
Continue to monitor course offerings and program changes elsewhere to update our own offerings.	<ul style="list-style-type: none"> • Physics Program • Reorganized Physical Science I and II and have been working on the common syllabus and common exam. Added advance lab, computational aspects in class and online homework served, online course materials, new courses. We initiated oral examinations 	University academic council Approval 2005 Common exams	University Catalog, departmental minutes in Dr. Kumar's office Oral exams evaluate each student with a rubric Assessment surveys for advanced labs Integrated computational homework...	Y

***For Academic Program Outcome see H-1-1**

***Reproduce this sheet as needed for each applicable Goal**

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

G-1. The Past: Major Outcome Achievements and Changes Since 2004 (Excluding Degree Program Outcomes Reported on Forms A-1) University Goal # 3 (see Goal List)

Unit Goal	Objectives/Outcomes	Methods of Assessment and Year	Evidence (Form and Location)	Outcome to be continued in 2009-2013 Cycle Y=Yes N=No
Increase the size and number of research grants	<ul style="list-style-type: none"> - A \$1.5M grant received by Dr. Storr from the DOE - Several grants from NASA received by Dr. Saganti - Dr. Erickson received a 3-year grant from NASA - Dr. Ciftja received an NSF grant from the division of Materials research - Dr. Orion Ciftja has been a part of TAMU's NSF-IGERT initiative - Dr. Kevin Storr received a grant from NSF to support his research in low temperature physics. - Dr. A. Anil Kumar received a grant from the Thurgood Marshall College Fund and the Bill and Melinda Gates Foundation as a part of their Gates-Marshall School Redesign Program. 	2005	Documentation pertaining to each of these grants can be found in the Department (room 330) or with the appropriate entity (Research Foundation / Office of Sponsored Programs)	Y
		2003-2008		
		2005		
Increase the number of publications	<ul style="list-style-type: none"> Dr. Saganti was author or co-author of 14 papers Dr. Ciftja was author or co-author of 17 papers 	2001-2008	CV on file in the Department	Y
		2003-2009	CV on file in the department	Y

***For Academic Program Outcome see H-1-1**

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

G-1. The Past: Major Outcome Achievements and Changes Since 2004 (Excluding Degree Program Outcomes Reported on Forms A-1) University Goal # 9 (see Goal List)

Unit Goal	Objectives/Outcomes	Methods of Assessment and Year	Evidence (Form and Location)	Outcome to be continued in 2009-2013 Cycle Y=Yes N=No
Expand interactions with schools	- Teacher Training sessions with Eisenhower H.S. and Aldine H.S. teachers	2004, 2005	Teacher worksheets and feedback, pictures of the training exercises	Y
	- Teacher Training and Mentoring of Royal H.S. teachers	2005-2009	Teacher worksheets and feedback documentation, pictures and videos of the training events, test scores of students	Y
	Collaborations with Waller ISD, Bellville ISD, Hempstead ISD, through Career Day activities, meeting with teachers and administrators, etc.	2003-2009	Documentation of encounters on file in the Department office, pictures of career day events available online at http://www.pvamu.edu/pages/2727.asp	Y
Increase the number of double majors in physics	Increase in the number of Physics Majors.	2005-2009	Academic Records located in NSCI 330	Y

***For Academic Program Outcome see H-1-1**

***Reproduce this sheet as needed for each applicable Goal**

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

G-1. The Past: Major Outcome Achievements and Changes Since 2004

(Excluding Degree Program Outcomes Reported on Forms A-1)

University Goal # 9 (see Goal List)

Unit Goal	Objectives/Outcomes	Methods of Assessment and Year	Evidence (Form and Location)	Outcome to be continued in 2009-2013 Cycle Y=Yes N=No
Continue to update departmental web site	Improved, updated, user-friendly website. Continual improvement in web access to department's activities and services.	2009	Department Head http://www.pvamu.edu/pages/2727.asp	Y

***For Academic Program Outcome see H-1-1**

***Reproduce this sheet as needed for each applicable Goal**

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

G-1-1. The Past 2004-2008: Main Student Learning Program Outcomes Assessment Summary (Schools, Colleges, Developmental Education, Under Graduate Medical Academy)

Program _____ Physics _____
 e.g., Geology, M.S. Geology, or Ph.D.

Referring to Forms A-1, Describe changes made to improve student learning (e.g. curriculum, technology, instructional methods, co-curricular activities, etc.)	Year(s) Change Made	Documentation Supporting Change (e.g. minutes, reports, statistical profiles, test scores, etc.)	Document Contact Person, Location and Form
<p>ESTABLISHMENT OF THE FOLLOWING PLO's:</p> <p>Outcome 1: Students can apply knowledge of mathematics, physics and modern computing tools to model and solve relevant scientific, engineering or educational problems.</p> <p>Outcome 2: Students can design and conduct experiments, as well as to analyze and interpret data.</p> <p>Outcome 3: Students can describe, evaluate, and set in perspective, the impact of scientific and engineering solutions.</p> <p>Outcome 4: The students can demonstrate that they act with personal and professional integrity and responsibility.</p> <p>Outcome 5: Students can communicate effectively with written, oral and visual means.</p>	2008	<p>Paper copies of projects, assignments, tests, and laboratory reports located in the instructor's office.</p> <p>Paper copies of laboratory reports and results located in the instructor's office</p> <p>Copies of presentation DVD and panel assignments located in the instructor's office.</p> <p>Paper copies of articles located in the instructor's office</p> <p>Paper copies of tests located in the instructor's office</p>	Respective Instructor, Department Head and the Physics Office.

***Reproduce this sheet as needed for each program**

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

G-1-2. The Past: 2004-2008 Major Academic Program Destination Outcomes Assessment Summary (Schools, Colleges, Developmental Education, UMA)

Program _____ Physics, B.S. _____

Destination of Degree/Program Completers (% to Graduate/Professional School, % to Labor Force, etc)	Year(s) Assessed	Documentation (e.g. statistical profiles, reports, etc.)	Document Contact Person, Location and Form
Jessica Alvaro – NAVY Nuclear Engineering Program	2009	NAVY ROTC	Department Head and the Physics Office.
Noah Rattler – Economic Development Specialist, Houston Airport System, Houston, TX	2009	http://www.linkedin.com/pub/noah-rattler/8/523/20	
Gilbert Nyandoto - Process Engineer, LHH (Semiconductors industry), Dallas, TX	2009	http://www.linkedin.com/in/gilbertnyandoto	

***Reproduce this sheet as needed for each program**

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

H. The Past: Unit Outcomes Assessment Summary for Units Without Formal Inclusion in the 2004-2008 Strategic Plan Update (skip all H Section Forms)

List Unit Functions at the Core of it's Mission (What would not take place at the University if the Unit Did Not Exist?)	Level of Achievement	Changes Made (e.g. Procedure/Rule change, Process change, Personnel adjustment, Software change, Organizational change)	Year(s)	Document Contact Person, Location and Form
<p>We provide the essential foundation for the science and engineering students.</p> <p>Student participation in research spearheaded by our faculty. Assisting other graduate programs by expanding thesis research project possibilities. Student research opportunities integrating equipment and process into curriculum.</p> <p>Initiated multi-university research collaborations (not possible without Physics department)</p> <p>Scientific Literature contribution by the faculty and the national/international visibility of the university</p> <p>W/o physics, the number of underrepresented individuals going into graduate programs in physics would be diluted</p>	<p>Comparable to major Texas institutions</p>	<p>Common Syllabus and Common Exams Courses Taught by faculty for free (e.g. Electricity & Magnetism, Nuclear and Radiation Physics)</p>	<p>2004-2007</p>	<p>Individual Instructor, Department Head and the Physics Office.</p>

We help to develop science teachers through our science education program				
Interdisciplinary research programs would suffer				

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

I. The Future: Unit Profile Changes (as appropriate)

Area of Change	Type of Change A=Add D=Delete M=Modify	Year	Cost or Savings
1. Organization – chairman rotation, assistant chairman (e.g. chair directly interfaces with dean and does administrative detail, assistant chair deals with academic affairs, scheduling of courses, and advising), selection process of chairperson (selection by faculty, peer selection)			
2. Program – a. physical science bachelor's degree; b. graduate program in physics	A A	2010 2012	No additional cost; Additional cost partly offset by increased undergraduate enrollments
3. Services – expand services to more high schools, community colleges and international students	A	2010	No additional cost
4. Policies/Procedures/Rules – Salary equity adjustments as needed at least once every two years	A	2010	Incurs cost but retains high caliber faculty
5. Other – salary commensurate with other units (e.g. College of Engineering, college of Business, school of architecture, juvenile justice) and institutions	M	2009	

Unit Goals/Outcomes Listing—Must include 5 year enrollment projections and retention goals as well.

<i>Department Goal</i>	<i>Outcome</i>
<i>1. Continue to modernize the Physics Department laboratories.</i>	▪ <i>Modernized laboratories</i>
<i>2. Continue to monitor course offerings and program changes elsewhere to update our own offerings.</i>	▪ <i>Updated course and program plans as they occur</i>
<i>3. Increase the size and number of research grants.</i>	▪ <i>Increase the number of proposals submitted by 50%.</i>
<i>4. Increase the number of publications.</i>	▪ <i>Increase the number of publications submitted by 50%.</i>
<i>5. Expand interactions with schools.</i>	<ul style="list-style-type: none"> ▪ <i>Expand interaction to include Waller and Hempstead ISDs during 2008-2009.</i> ▪ <i>Expand to at least one more school per year in the Houston, Waller and Katy areas.</i>
<i>6. Increase the number of double majors in physics.</i>	▪ <i>Increase the number of double majors by 50% per year.</i>
<i>7. Develop and implement articulation agreements with community colleges.</i>	<ul style="list-style-type: none"> ▪ <i>MOU with Cy-Fair College during 2008-2009</i> ▪ <i>MOU with Blinn College during 2009-2010</i>
<i>8. Continue to update departmental web site.</i>	▪ <i>Continual improvement in web access to department's activities and services.</i>

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

J-1. The Future: Projected Outcome Achievement by TAMUS Imperative and University Goal (Excluding Degree Program Outcomes Reported on Forms A-1)

**TAMUS Imperative #1: Openness and Accountability
 Related University Goal Number(s): (2) Improve Academic Indicators, (4) Strengthen Environmental Health and Safety Programs on Campus, (9) Increase and Enhance the Visibility and Awareness of the University to The Community at Large/All Stakeholders**

Unit Goal	Projected Objectives/Outcomes	Means of Assessment By Year	Strategies Used	Savings or New Cost per Strategy
<ul style="list-style-type: none"> ▪ To be transparent in every activity ▪ To clearly communicate vision and initiatives ▪ To make safety a mindset in all faculty, staff and student assistants ▪ To comply with all PVAMU's and TAMUS' policies ▪ Implement strategic planning framework 	<ul style="list-style-type: none"> ▪ Enhanced accountability ▪ Enhanced visibility and trust in outside agencies ▪ Maximum safety standards and implementations in laboratories ▪ Enhanced compliance ▪ Periodic reports/updates 		<ul style="list-style-type: none"> ▪ Continually communicate with faculty, staff, student assistants, students and their guardians, our external partners 	

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

K-1. The Future: Projected Outcome Achievement by TAMUS Imperative and University Goal

**TAMUS Imperative #2: Excellence through Academics & Extension
 Related University Goal Number(s): (1) Strengthen the Quality of Academic Programs; (7) Promote Programs that Contribute to Student Success; (9) Increase and Enhance the Visibility of the University at Large/All Stakeholders; (10) Strengthen the Quality of the Athletics Program**

Unit Goal	Projected Objectives/Outcomes	Means of Assessment By Year	Strategies Used	Savings or New Cost per Strategy
<ul style="list-style-type: none"> ▪ To supplement classroom instruction with online material ▪ Continue to strengthen and build new partnerships with ISDs and community colleges ▪ Continually update physics website to enhance outreach ▪ Continue to excel in faculty and staff performance 	<ul style="list-style-type: none"> ▪ Enhanced access to learning materials & Improved student performance ▪ Strengthened curricula in ISDs, reduction in remediation, increase in graduation rates, recognitions from partners ▪ Useful, easily navigable website ▪ Excellent teaching, scholarly publications, increased research funding 	<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪ Keep abreast of developments across the U.S. and the globe, changing needs of the market and continually adapt. 	<ul style="list-style-type: none"> ▪

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

K-1. The Future: Projected Outcome Achievement by TAMUS Imperatives and University Goals

TAMUS Imperative #3: Research

**University Goal Number(s): (3) Increase Applied and Basic Research;
(8) Strengthen University Advancement Programs Including Research**

Unit Goal	Projected Objectives/Outcomes	Means of Assessment By Year	Strategies Used	Savings or New Cost per Strategy
<ul style="list-style-type: none"> ▪ Conduct research on issues of state and national relevance ▪ Form collaborations to enhance capabilities and strengthen the infrastructure ▪ Initiate efforts towards commercialization – leveraging specialized lab facilities & work on patentable products 	<ul style="list-style-type: none"> ▪ Enhanced relevance for the department ▪ Enhanced return on investment to the taxpayer 	<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪ Identify and respond to potential opportunities ▪ Identify potential collaborators to complement existing capabilities ▪ Work with TAMUS Vice Chancellor for Research & Commercialization 	<ul style="list-style-type: none"> ▪

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

K-1. The Future: Projected Outcome Achievement by TAMUS Imperatives and University Goals

**TAMUS Imperative #4: Resources Optimized and Leveraged
University Goal Number(s): (5) Achieve and Maintain Financial Stability (6) Increase the Efficiency of University Operations**

Unit Goal	Projected Objectives/Outcomes	Means of Assessment By Year	Strategies Used	Savings or New Cost per Strategy
<ul style="list-style-type: none"> ▪ Continue to implement “Go Green” efforts by minimizing paper usage, increasing recycling efforts, etc. ▪ Increase revenue via external grants to add value to PVAMU, TAMUS and Texas 	<ul style="list-style-type: none"> ▪ Enhanced savings and reduced waste in materials, and other resources ▪ Enhanced trust in clients as to our stewardship 	<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪ Conduct more and more communications via e-mail ▪ Utilize website for information dissemination 	<ul style="list-style-type: none"> ▪

Quality Without Compromise – The Strategic Plan Update for Years 2009-2013

K. The Future: Assessment Record Report Summary for Academic Degrees/Programs

Degree/Program Name: _____ **PHYSICS** _____

UNDER PREPARATION

Outcomes	Means or Measures	Data Collection Schedule	Data Analysis Schedule	Data Distribution Schedule
Student Learning	Improved test scores Improved performance on projects Evaluations from summer internships	Throughout each semester	Throughout each semester	
Student Destination	Sites of placement of employment or advanced study	As student(s) graduate(s)	Once a year	